



# Environment, Energy Security & Sustainability Symposium & Exhibition



## Leveraging Technology to Support the Army's Net Zero Installation Initiative 23 May 2012

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# Current Mandates



| Federal Mandate                            | Energy Topic  | Energy Performance Target   |
|--|---|---|
| Energy Policy Act of 2005                  | Electricity use for federal government from renewable sources   | <ul style="list-style-type: none"><li>At least 3% of total electricity consumption (FY07-09), 5% (FY10-12), 7.5% (FY13 +)</li></ul>   |
| Executive Order 13423                      | Energy use in Federal buildings                                 | <ul style="list-style-type: none"><li>Reduce 3% per year to total by 30% by FY2015 (FY2003 baseline)</li></ul>  |
|  | Total consumption from renewable sources                        | <ul style="list-style-type: none"><li>At least 50% of required annual renewable energy consumed from "new" renewable sources</li></ul>  |
|  | Fleet vehicle alternative fuel use                              | <ul style="list-style-type: none"><li>Increase by 10% annually to reach 100% (Base line FY2005)</li></ul>   |
| Energy Independence & Security Act of 2007 | Total consumption from renewable sources                        | <ul style="list-style-type: none"><li>25% by FY2025 - "Sense of Congress"</li></ul>   |
|  | Hot water in new / renovated federal buildings from solar power | <ul style="list-style-type: none"><li>30% by FY2015 if life cycle cost-effective</li></ul>  |
|  | Fossil fuel use in new / renovated Federal buildings            | <ul style="list-style-type: none"><li>Reduce 55% by FY2010; 100% by 2030</li></ul>  |
| Executive Order 13514                      | GHG emission reduction  | <ul style="list-style-type: none"><li>DoD Goal: reduce Scope 1 &amp; 2 GHGs by 34% by FY2020</li><li>DoD Goal: reduce Scope 3 GHGs by 13.5% by FY2020</li></ul>                             |
|  | Net zero buildings  | <ul style="list-style-type: none"><li>All new buildings that enter design in FY2020 &amp; after achieve net zero energy by 2030</li></ul>   |
|  | Water consumption   | <ul style="list-style-type: none"><li>Reduce consumption by 2% annually for 26% total by FY 2020 (FY2007 baseline)</li></ul>  |
|  | Waste minimization  | <ul style="list-style-type: none"><li>Divert at least 50% of solid waste &amp; 50% of C&amp;D waste by FY2015</li></ul>   |
| National Defense Authorization Act, 2010   | Renewable Fuels Use   | <ul style="list-style-type: none"><li>Directs the Secretary of Defense to consider renewable fuels in aviation, maritime, &amp; ground transportation fleets.</li></ul>                     |
|  | Facility Renewable Energy Use                                   | <ul style="list-style-type: none"><li>Produce or procure 25 % of the total quantity of facility energy needs, including thermal energy, from renewable sources starting in FY2025</li></ul> |



# Net Zero Hierarchy



“The primary goal is a focus toward net zero and when we talk about net zero, it's not only net zero energy, but it's net zero energy, water, and waste. When you look at the term "net zero" or a hierarchy of net zero you must start with reduction, then progress through repurposing, recycling, energy recovery, disposal being the last.”

— HON Katherine Hammack, DoD Bloggers Roundtable, 10 October 2010

- **A Net Zero ENERGY Installation** is an installation that produces as much energy on site as it uses, over the course of a year.
- **A Net Zero WATER Installation** limits the consumption of freshwater resources and returns water back to the same watershed so not to deplete the groundwater and surface water resources of that region in quantity or quality.
- **A Net Zero WASTE Installation** is an installation that reduces, reuses, and recovers waste streams, converting them to resource values with zero solid waste to landfill.
- **A Net ZERO INSTALLATION** applies an integrated approach to management of energy, water, and waste to capture and commercialize the resource value and/or enhance the ecological productivity of land, water, and air.



# Pilot Installations





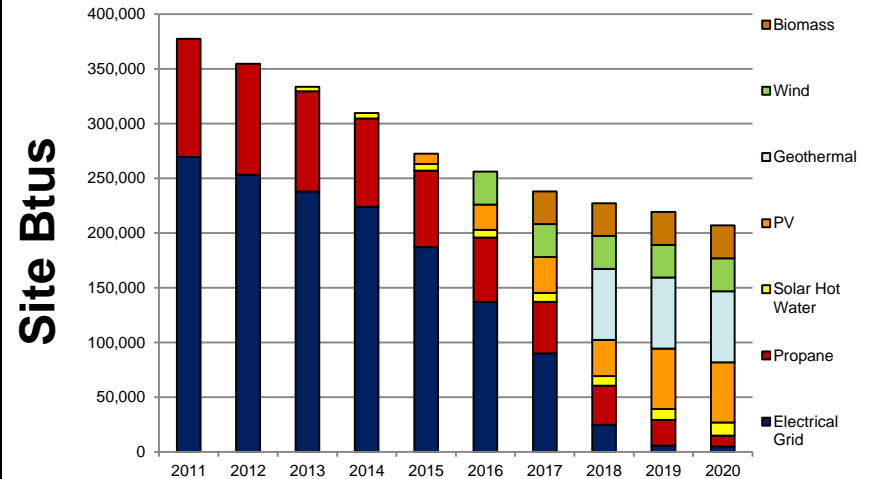
# Net Zero Strategy



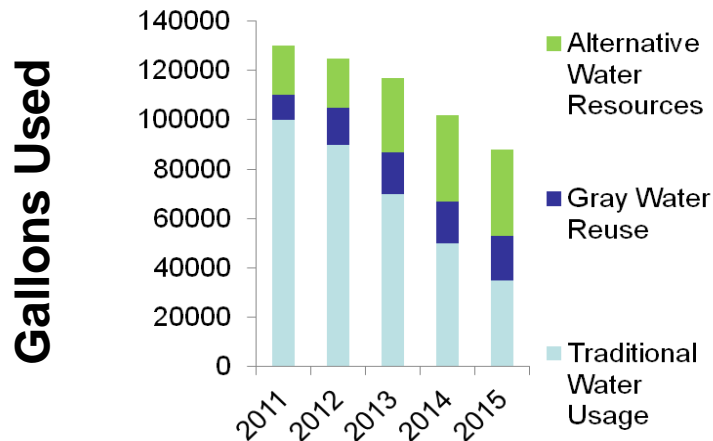
## Net Zero Goals

- Improve energy and water security
- Reduce consumption
- Address efficiency and conservation
- Access/Develop alternative water sources
- Minimize solid waste generation
- Integrate into Master Planning
- Be fiscally responsible
- Incorporate behavioral change

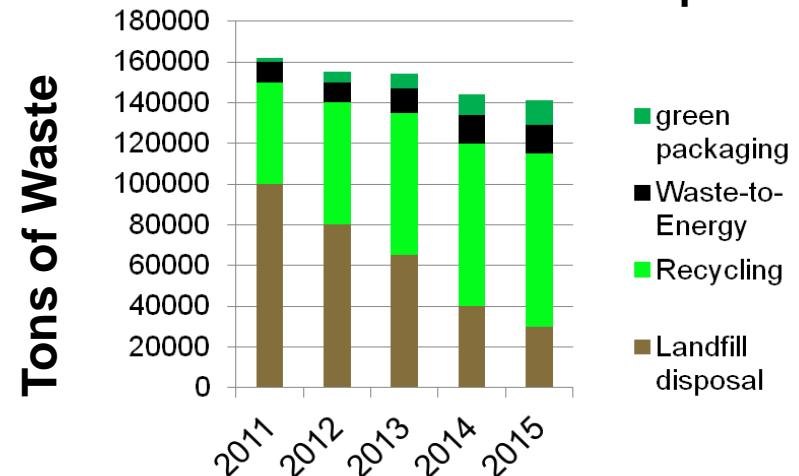
## Net Zero Energy Roadmap



## Net Zero Water Roadmap



## Net Zero Waste Roadmap



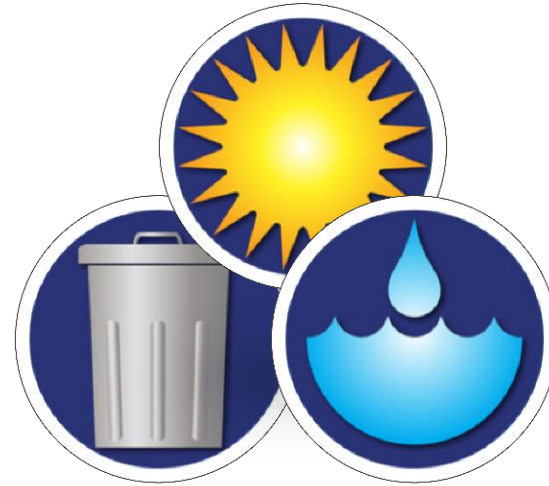


# A Systems-of-Systems Approach



- **Interconnections**

- Energy and Water
- Water and Waste
- Waste and Energy



- **Net zero must be addressed holistically across energy, water, and waste**





# Net Zero Energy Fort Hunter Liggett



- **Reduced energy intensity by 40% (FY2003-2010)**
  - Behavioral changes
  - Implemented low-demand technologies
  - Energy-efficient new construction
- **Constructing a 1 MW solar power system**
  - Funded by Energy Conservation Investment Program
  - Will produce 1,500 MWh annually
  - Will provide 12% of the installation's energy
- **2<sup>nd</sup> 1 MW solar system in development**



Carport Style PV System





# Net Zero Energy Fort Hunter Liggett



- **Third 1 MW solar array planned for FY13**
- **Fourth 1 MW solar array planned for FY14**
- **Energy Efficiency Analysis of 28 buildings**
- **Assessing other renewable energy opportunities (solar, geothermal, waste-to-energy hydrogen production for fuel cells)**
- **Assessing microgrid for energy security after achieving net zero**





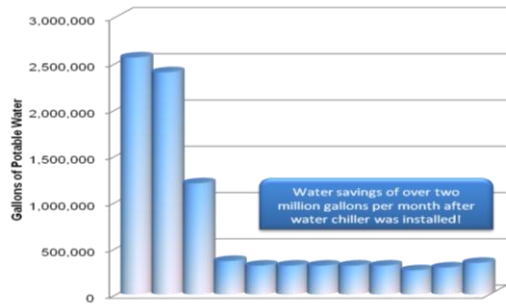
# Net Zero Water Tobyhanna AD



**Wastewater Reuse at Sewage Treatment Plant**



**Water Chiller Water Savings**



- Replaced potable water with process water for foam suppression at wastewater treatment plant
  - \$1,200 investment saves 300,000 gallons/month
  - Payback period: 1 month
- Installed a water chiller to replace single-pass cooling system
  - \$125,000 investment saves 2,000,000 gallons/month
  - Payback period: 8 months



# Net Zero Water

## Tobyhanna Army Depot



### Leak Detection

- Acoustic leak detection survey identified six system leaks responsible for 26% of average daily water use.
- Leak detection sensors identified three minor leaks to date.



Monthly reviews are conducted on 54 leak detection sensors placed on TYAD water main valves

| DOD Goal   | Net Zero Area   | FY10 Status | FY11 Status |
|--|---|-------------|-------------|
| Potable Water Use<br>Target: 26% by FY2020<br>Baseline: FY2007 | Potable Water Use<br>Target: 26% by FY2015<br>50% by FY2020<br>Baseline: NA | 14%         | 34%         |



# External Collaboration



- **Federal agencies:**

- DOE: FEMP, NREL, PNNL on Net Zero energy & water
- EPA: technologies to support Net Zero Water
- GSA: HPSBs, Net Zero energy & water for multiple building complex

- **Local & Regional partnerships**

- Pilot installations are working with local communities to develop local & regional solutions (e.g., renewable energy, recycling, WTE)

- **Public-private partnerships**

- Targeted to implement large-scale renewable energy projects



The image features four soldiers in silhouette, standing in a line and holding rifles. They are positioned against a bright, cloudy sky at sunset or sunrise, with the sun low on the horizon. The soldiers are wearing helmets and tactical gear. The text "ARMY STRONG" is overlaid in the center in a large, white, bold, sans-serif font.

# ARMY STRONG